WHAT IS CLAIMED IS:

1. A tunable optical filter comprising:

a plurality of electroholographic (EH) gratings with different center wavelengths, said EH gratings being optically connected such that an input optical signal can pass through at least one of said plurality of EH gratings, wherein said EH gratings are activated to filter said input optical signal in response to an applied voltage.

2. The tunable optical filter of claim 1 further including:

electrode pairs associated with said EH gratings for applying voltage across EH gratings of a desired center wavelength to activate said EH gratings with said desired center wavelength; and

a voltage controller associated with said electrode pairs for controlling the application of voltage across said EH gratings by the respective electrode pairs.

3. The tunable optical filter of claim 2 wherein EH gratings of the same center wavelength are controlled simultaneously by said voltage controller.

4. The tunable optical filter of claim 1 wherein said EH gratings are tunable over a range of wavelengths in response to adjustments in the applied voltage.

5. The tunable optical filter of claim 4 wherein the tunable wavelength ranges of said EH gratings combine to form a continuously tunable wavelength range.

6. The tunable optical filter of claim 1 wherein at least two of said EH gratings having different center wavelengths are optically connected such that an input signal can pass through said at least two EH gratings in series.

7. The tunable optical filter of claim 1 further including:

an input birefringent element, located in an optical path that is before said plurality of EH gratings, for splitting said input optical signal into first and second polarized beams having different polarization states before said input optical signal passes through said plurality of EH gratings;

wherein said plurality of EH gratings includes a first group of EH gratings having different center wavelengths that are optically connected such that said first polarized beam can pass through said first group of EH gratings and a second group of EH gratings having the same center wavelengths as said first group of EH gratings that are optically connected such that said second polarized beam can pass through said second group of EH gratings, said first and second polarized beams passing through the respective groups of EH gratings in parallel.

8. The tunable optical filter of claim 1 wherein said EH gratings are formed in photorefractive crystals.

9. The tunable optical filter of claim 1 wherein said plurality of EH gratings are included within a chirped grating.

10. The tunable optical filter of claim 1 further including:

an input birefringent element, located in an optical path that is before said plurality of EH gratings, for splitting said input optical signal into first and second polarized beams having different polarization states before said input optical signal passes through said plurality of EH gratings;

an input polarization rotator, located in an optical path that is between said input birefringent element and said plurality of EH gratings, for bringing said first and second polarized beams to the same polarization state;

an output birefringent element, located in an optical path that is after said plurality of EH gratings, for combining said first and second polarized beams into an output signal after said first and second polarized beams have passed through said plurality of EH gratings; and

an output polarization rotator, located in an optical path that is between said plurality of EH gratings and said output birefringent element, for bringing said first and second polarized beams to different polarization states.

11. The tunable optical filter of claim 10 wherein a first set of electroholographic filter elements (EFEs), which includes a first group of said EH gratings, are aligned to filter said first polarized beam and a second set of EFEs, which includes a second group of said EH gratings are aligned to filter said second polarized beam.

12. The tunable optical filter of claim 10 wherein said input polarization rotator includes a half-wave plate that rotates the polarization state of one of said first and second polarized beams by ninety degrees.

13. The tunable optical filter of claim 10 wherein said output polarization rotator includes a half-wave plate that rotates the polarization state of one of said first and second polarized beams by ninety degrees.

14. The tunable optical filter of claim 1 further including polarization rotators located between EH gratings that have the same center wavelength.

15. A method for filtering an optical signal comprising:

passing an optical signal through a series of electroholographic (EH) gratings with different center wavelengths, said EH gratings being activated in response to an applied voltage; and

selectively applying a voltage across at least one of said EH gratings to activate said at least one EH grating, thereby filtering the optical signal at a desired center wavelength.

16. The method of claim 15 further including adjusting the voltage that is applied across said at least one EH grating to tune the center wavelength of said at least one EH grating.

17. The method of claim 15 further including applying a voltage to a different one of said EH gratings to filter said optical signal at a different center wavelength.

18. The method of claim 15 further including filtering across a range of wavelengths by serially activating and tuning different sets of said EH gratings.

19. The method of claim 15 further including simultaneously applying voltage across a set of EH gratings that have the same center wavelength.

20. The method of claim 15 including:

splitting said optical signal into two polarized beams before said optical signal is passed through said series of EH gratings; and

rotating the polarization state of one of said beams such that said two polarized beams have the same polarization state before said two polarized beams are passed through said series of EH gratings.

21. The method of claim 20 further including recombining said two polarized beams after said two polarized beams have passed through said series of EH gratings.

22. The method of claim 15 further including rotating the polarization states of said two polarized beams after said beams have been filtered by activated EH gratings.

23. The method of claim 15 wherein passing an optical signal through a series of EH gratings with different center wavelengths includes passing said optical signal through a chirped EH grating.

24. A tunable optical filter comprising:

a plurality of EFEs that are optically aligned in a series of sets such that an input optical signal can pass through each set of EFEs, each set of EFEs including EH gratings that have different wavelength ranges than the other sets of EFEs.

electrode pairs associated with each EFE for applying voltage across said EFEs to activate said EH gratings within said EFEs; and

a voltage controller associated with said electrode pairs for controlling the application of voltage to said EFEs by the respective electrode pairs.

25. The tunable optical filter of claim 24 wherein said EH gratings within said EFEs are tunable over said wavelength ranges in response to adjustments in the applied voltage.

26. The tunable optical filter of claim 25 wherein the tunable wavelength ranges of said EH gratings within said EFEs combine to form a continuously tunable wavelength range.